Developing & Validating a Center Earned Value Management System

Delivered by: Calvin R. Chambers

Jet Propulsion Laboratory, California Institute of Technology

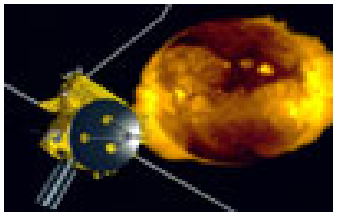
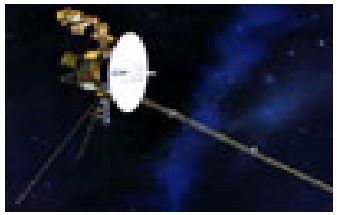
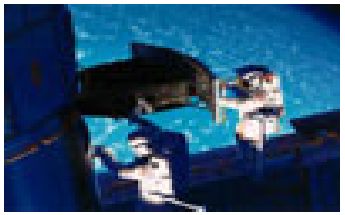
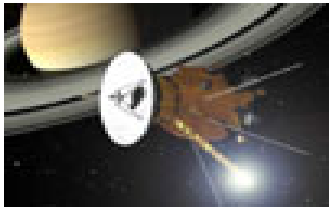
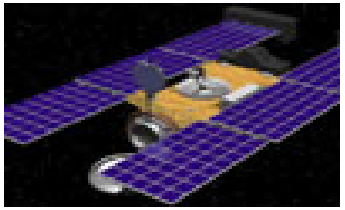
Agenda

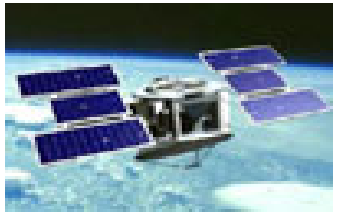
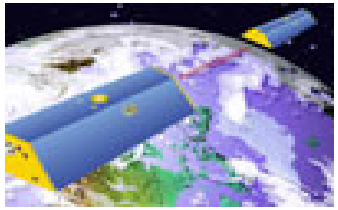
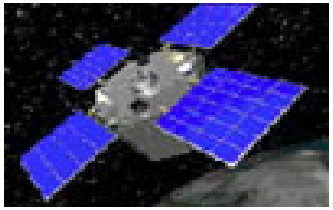
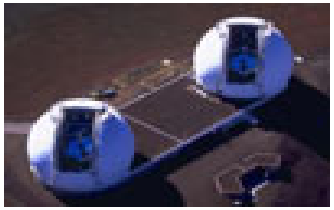
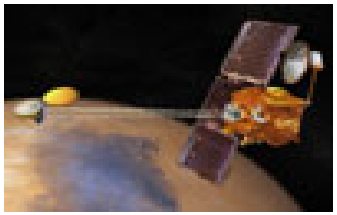
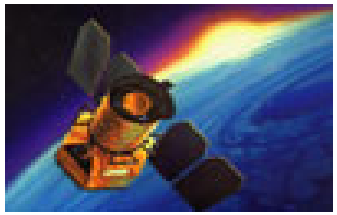
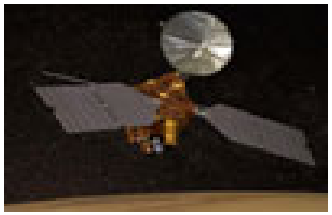
- Background
  - JPL at a Glance
  - Program Business Management Division
  - EVM System Development Timeline
- Key Components of EVM System
  - Architecture
  - Implementation
  - Education & Training
- EVMS Validation
  - Progress Assistance Visits
  - Validation Review

JPL at a Glance

- NASA's Jet Propulsion Laboratory
  - Federally Funded Research and Development Center
  - A division of the California Institute of Technology
- Dedicated to
  - Robotic space science and exploration
  - The scientific study of the Earth as a planet
- In total, JPL has
  - Nineteen spacecraft
  - Six instruments arrayed across the solar system

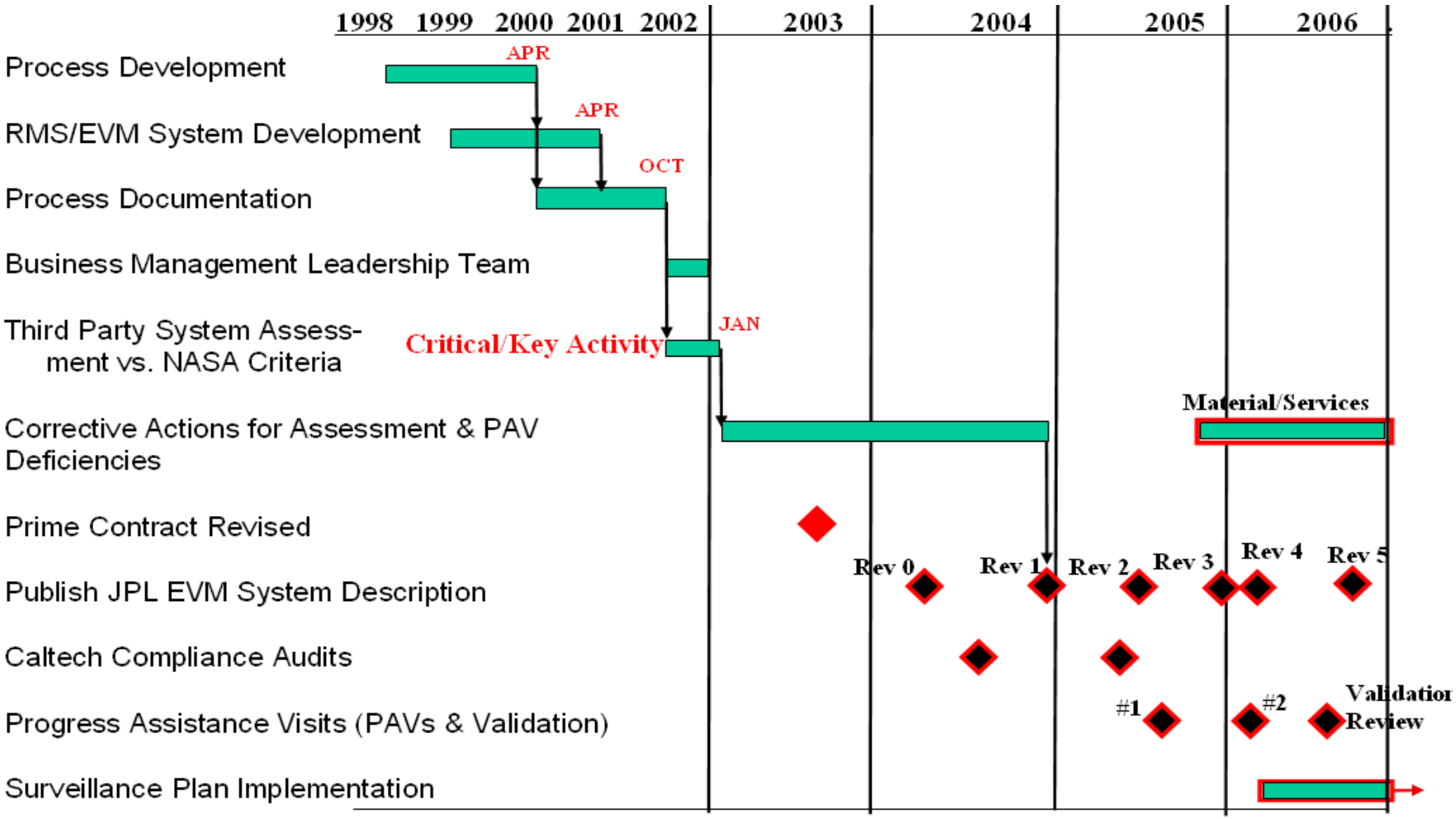
JPL at a Glance – Projects

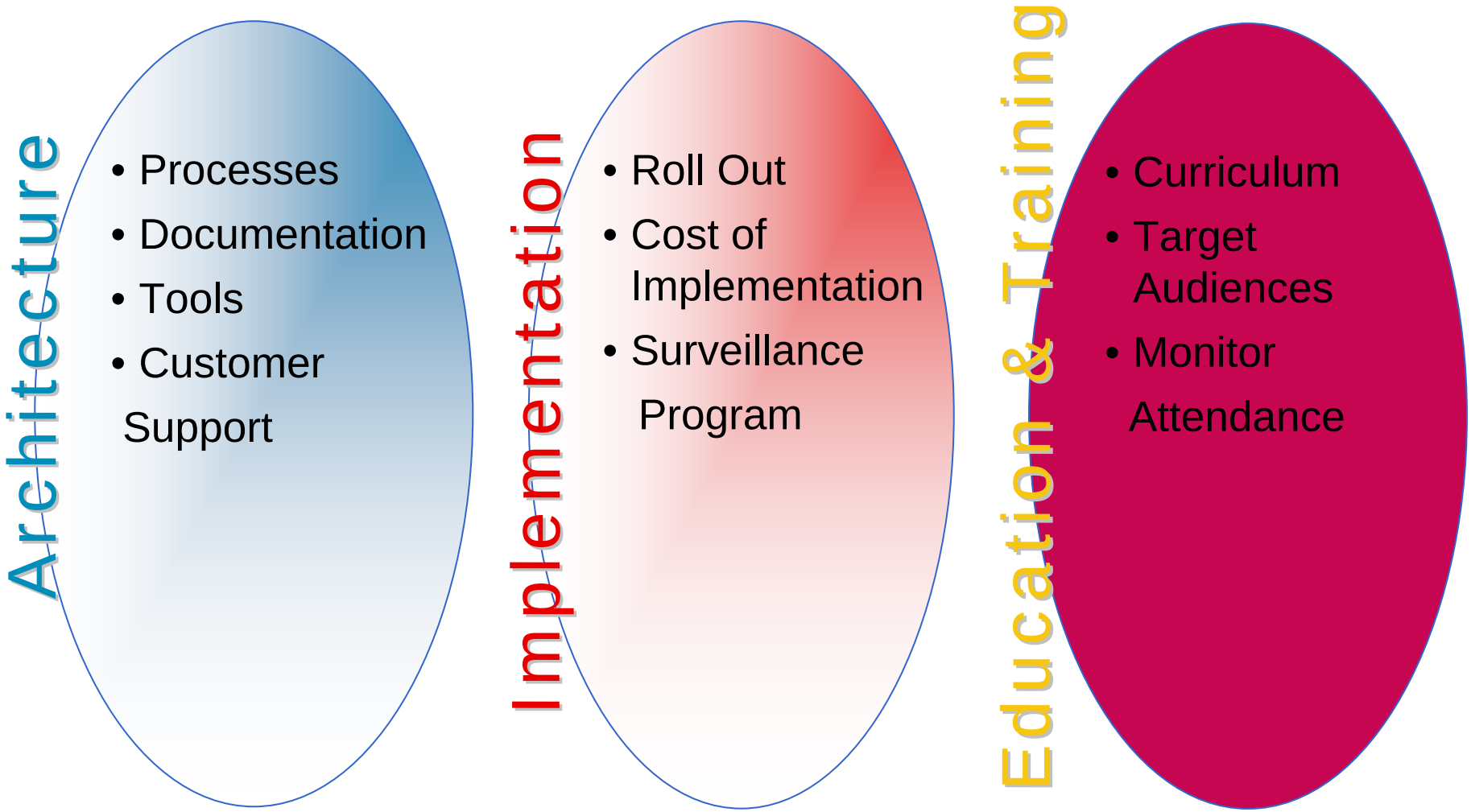








http://www.nasa.gov/centers/jpl/missions/index.html

EVM System Development Timeline



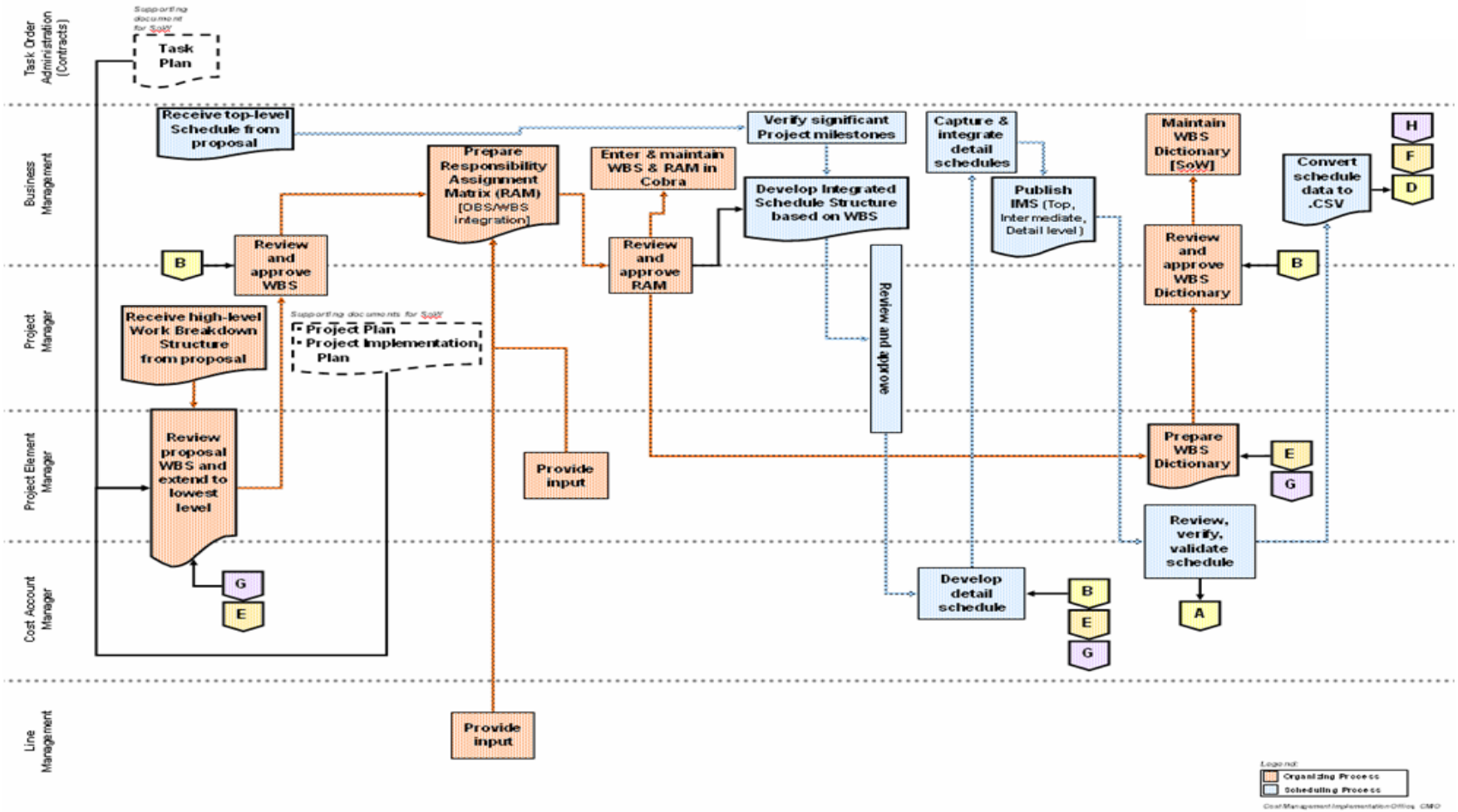
Key Components of EVM System



Key Components of EVMS – The Process

Architecture

Story Boarding



Processes – Lessons Learned

- Define and system engineer your processes
- Document your process
- Understand and negotiate the interfaces between your processes, especially when they cross organizational boundaries
  - Accounting, Risk Management, Subcontract Management, Material Management
- Beware of Functional Silo's
  - Functional Organizations will sub optimize the end-to-end process to simplify their own roles
- Integrate the Process with the Tools and then run a Pilot

Key Components of EVMS – Documentation

Architecture

System Description

JPL

EARNED VALUE MANAGEMENT

SYSTEM DESCRIPTION

September 2006

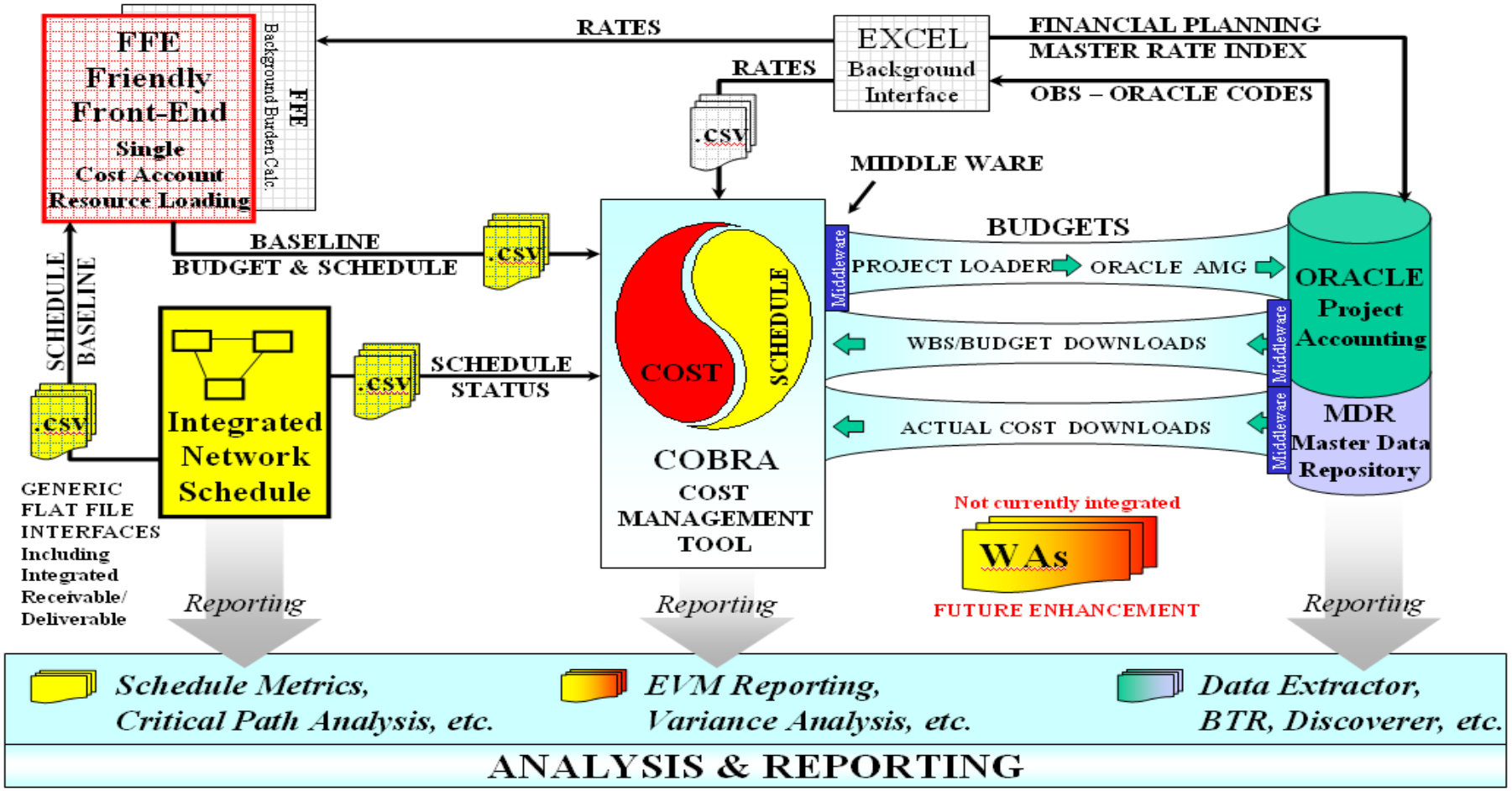
Table of Contents

Documentation – Lessons Learned

- Utilize outside reviews to strengthen your System Description
  - 3rd Party Assessments
  - Caltech Audit
  - DCMA PAV's
- Include cross walk that maps the EVM Criteria & Guidance to Systems Description procedures
- If possible, provide one, all-inclusive document
  - Guidance
  - Process
  - Procedure
  - Responsibilities

Key Components of EVMS – Tools

JPL's Resource Management System (RMS)



Tools – Lessons Learned

- Form Integrated Product Development Team
  - Responsible for Process
  - System
  - Tools
  - Education
  - Training
  - Surveillance
- Provide sufficient end user functionality or they won't use your "tools"

Tools – Lessons Learned

- User friendly (Excel-friendly front end)
- Build business rules into the system
- Manage end user expectations with in system limitations
- Employ System Engineering
  - Requirements Tracking
  - Data Flow Diagrams
  - Software Management Plan
  - System Configuration Management
  - Interface Control Documents

Tools – Lessons Learned

- Perform adequate testing
  - Consider adding a Software Test Engineer to the team
  - Develop Test Plans and procedures
  - Perform regression testing across software interfaces
- Develop Systems Architecture that supports end users
  - Cobra, FFE, FFEX: still running on the Desk Top
  - 190 Cobra/FFEX Users & 1600+ FFE Users
  - Downside: System Configuration issues

Tools – Lessons Learned

- Conduct Reviews
  - Functional Requirements Review (1)
  - System Architecture Review (1)
  - Technical Design Reviews (6)
  - Critical Design Review (1)
  - Delivery to Operations Review (2)
  - Tracked Disposition of Requirements tracking
    - Mandatory
    - Desirable
    - Rejected
  - If Rejected, Explain WHY?

Tools – Lessons Learned

- Review Attendance is Critical
  - Who reviewed this thing?
  - Stakeholders (Programs & Projects)
  - Functional Organizations
  - End Users
  - Role Players (CAM's, PEM's)

Key Components of EVMS – Customer Support

- Liaison Support
  - Formulation Team
  - Institutional Business Systems
  - Institutional Exercises
  - Institutional Business Issues
- Customer Support Group
  - End User Support – System/Tool Upgrades, Process issue resolution
  - RMS User Group
  - Service Requests
  - Work Shops
  - Tool Training

Key Components of EVMS – Customer Support

- RMS Web Site
  - System Architecture
  - Process Flows
  - Systems Description
  - User Guides
  - System Upgrade release notes

Key Components of EVMS – Customer Support

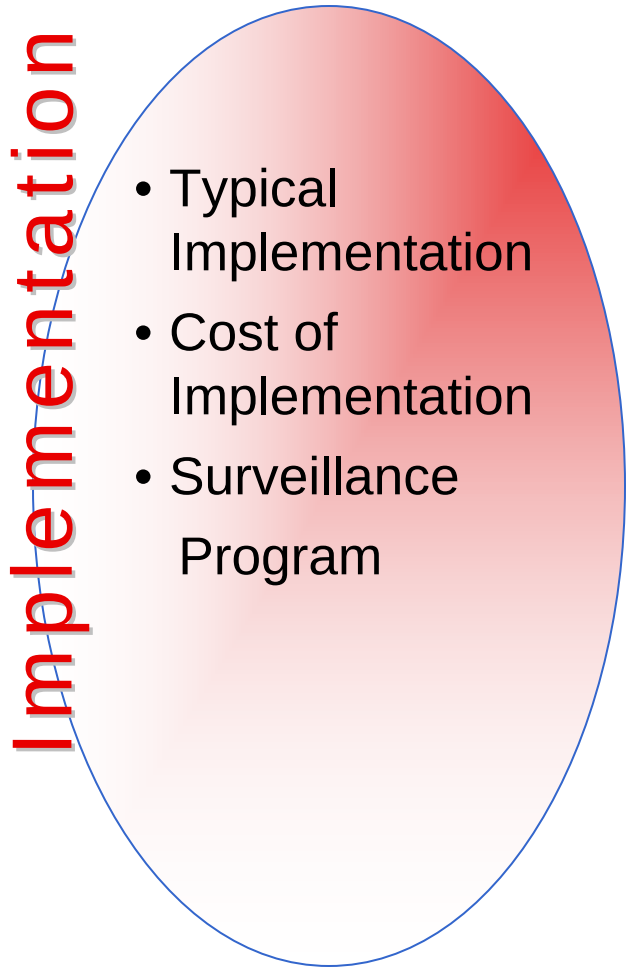
Customer Support – Lessons Learned

- Provide job aids to end user's
  - RMS website
  - User guides
  - Check lists
  - Update Instructions (online tutorials)
- Communicate system changes to end users (multi-media)
- Conduct workshops on complex project management processes
  - Estimates-to-complete
  - Re-baseline
  - Work package planning
  - Variance analysis

Customer Support – Lessons Learned

- HELP DESK SUPPORT!!!!!!
  - Timbuktu (remote capability to take over end user work station)

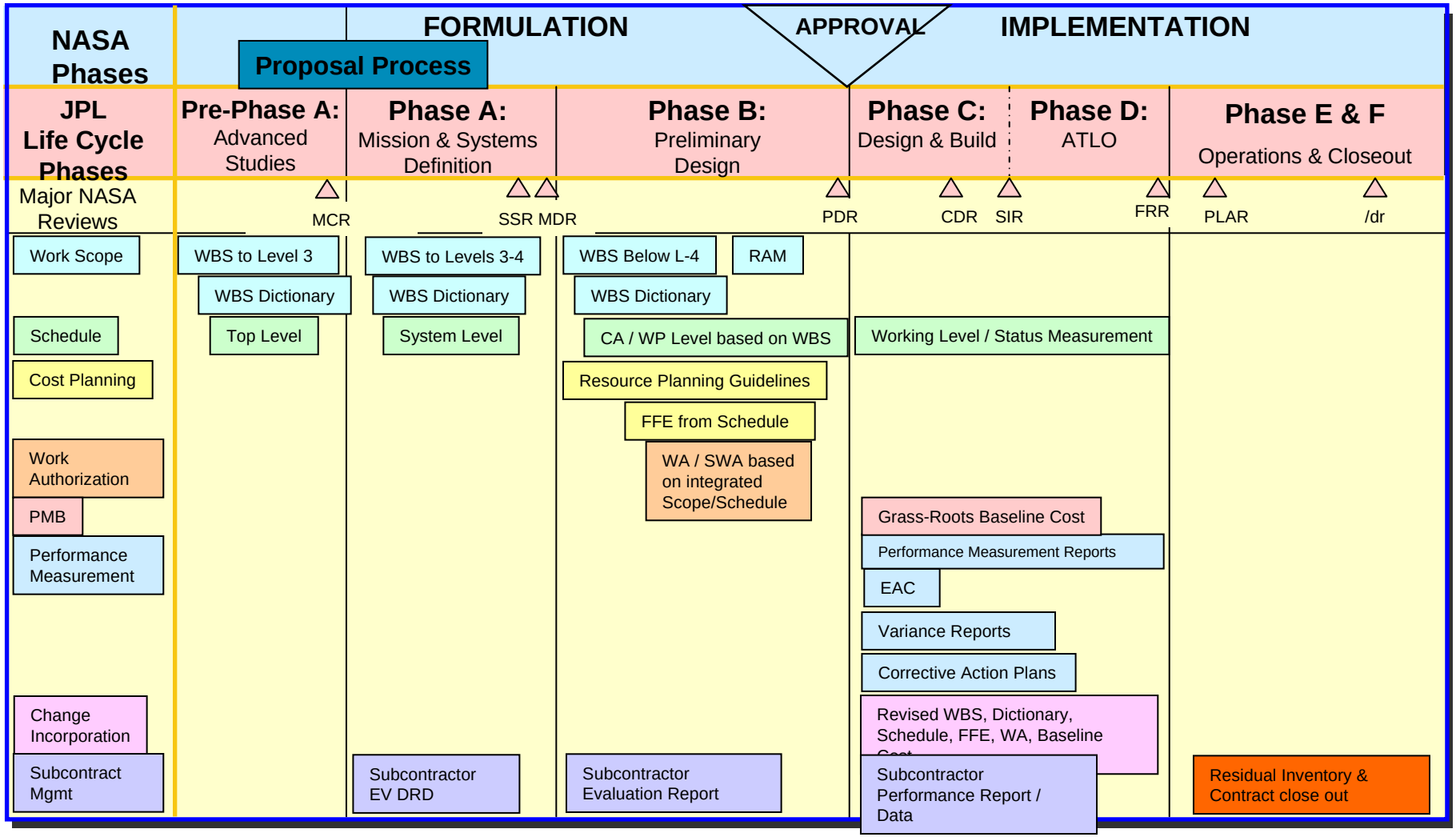
Key Components of EVMS – Implementation



Typical Implementation

- Project Applicability
  - Projects over $20M full life-cycle cost (7120.5D) (excluding launch vehicle)
  - Projects entering Phase C/D after October 2003
  - Other Projects **as requested/ required** by NASA
- A Life Cycle Process
  - Foundational work for resource planning begins with Proposals & Pre-phase A projects
  - Phase A→B Transition and early Phase B Projects convert to Resource Management System for Performance Measurement Baseline (PMB) development

Typical Implementation



Typical Implementation – Cost

- Cost Account Manager (CAM) investment
  - More intensive planning during Phase B
  - Roughly 10% additional CAM time for Analysis & Corrective Action Planning during Phase C/D
  - Business personnel requirements – Phase B/C/D
    (Project Business Mgr., Project Schedule Analysts, & Project Resource Analysts)*
  - Total Project Value B/C/D — Est. Business Staff *(includes PBM* + PSAs + PRAs)*

Total Project Value B/C/D	Est. Business Staff (includes PBM* + PSAs + PRAs)
$500M to $1B	7.0 – 9.0 FTEs Phase B/C/D
$200 to $500M	5.0 – 7.0 FTEs Phase B/C/D
$70 to $200M	4.0 – 5.0 FTEs Phase B/C/D
$25 to $70M	2.0 FTEs Phase B/C/D

  - Life-Cycle business staffing profile GUIDELINES & the Procedure for Estimating Business Staffing is found in JPLRules! *(DocID 68053 & 68054)*

A Project Business Manager is mandatory for Projects $200M and greater.

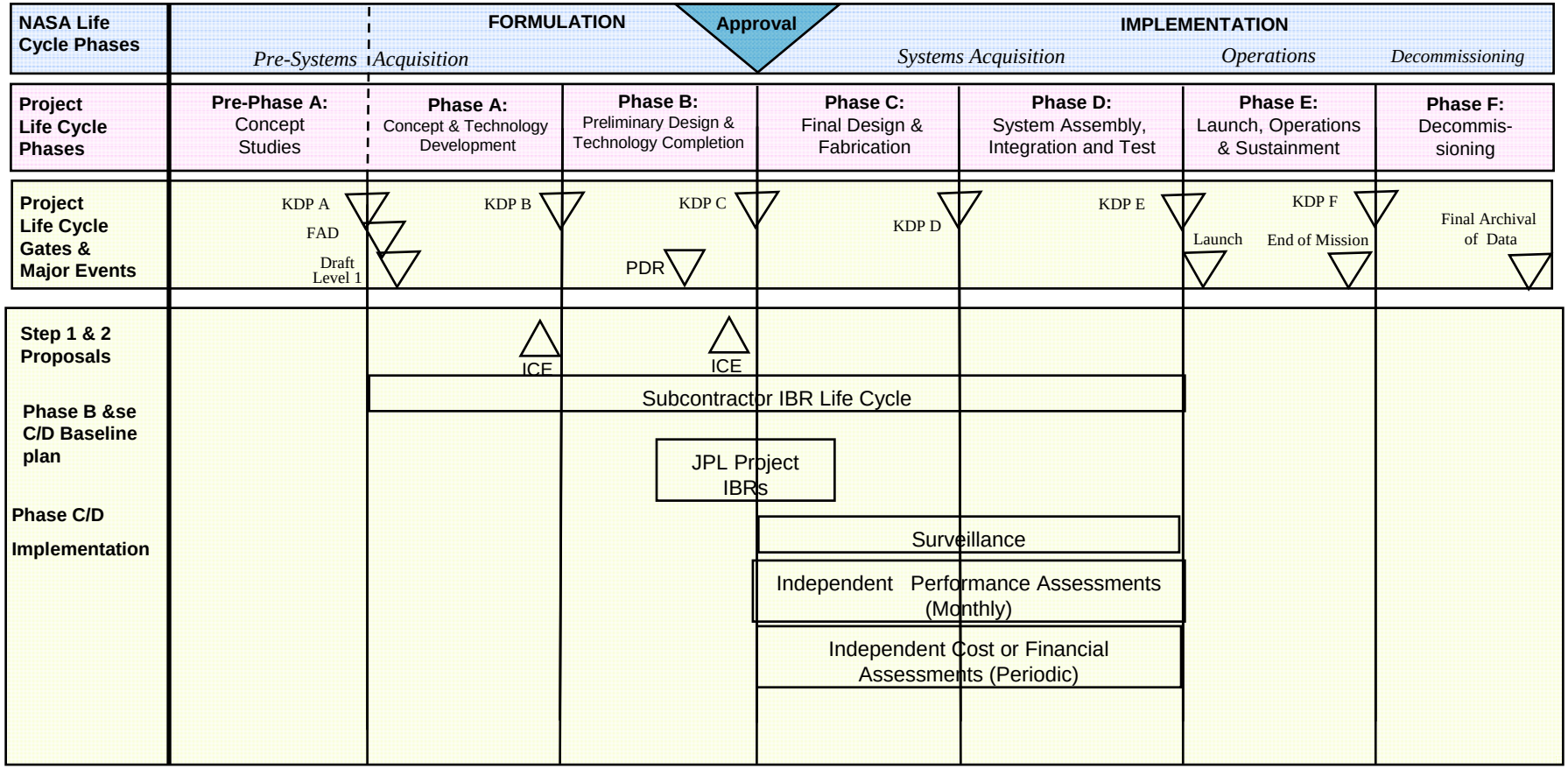
Typical Implementation – Support

- During Phase B Cost Management Implementation Office (CMIO) collaborates with Projects in support of EVM implementation
  - Coaching/Mentoring
  - Planning guidelines
  - Subcontractor flow down of EVM Reporting requirements
  - Subcontractor IBR planning & preparation
  - Evaluation of baseline plan (Metrics test)

Implementation Support – Lessons Learned

- Provide proposal estimating guidance for Project Business Management
- Liaison support helps transition projects into EVM
- Reduces the projects concerns regarding EVM implementation
- Lack of liaison support led to critical process failures

Surveillance Program



ACRONYMS
PDR—Preliminary Design Review
FAD— Formulation Authorization Document
KDP— Key Decision Point

Surveillance Review Process

- Planning and kick-off
- Data review and analysis
- Reporting
  - Audit Report including projects corrective actions
- Subsequent review actions
  - Documented closeout of corrective actions

Surveillance Reviews – Lessons Learned

- Surveillance issues must be monitored and assessed
  - Process
  - System
  - Tool
  - Education & training
  - Practice
- Projects corrective actions must be monitored
  - Caltech Audit Services provided additional “horse power” for monitoring and closeout of action items

Education & Training

Curriculum

- Executive Management Course
  - Executive Council
  - Division Management
- Cost Planning, Scheduling, Estimating & Performance Management Course (4.5 days)
  - Project Teams (PM, PEM, CAM, PRA/PSA)
  - Tailored RMS training for Line Org. Administrators
  - 25 Business Management training nearly complete
- Integrated Material Management
- Project Bus. Mgt Division EVM training modules

Curriculum

- Specifically tailored tool training
  - FFE
  - FFE Power User
  - Work Agreement
  - Work Agreement Custodian
  - Deltek Cobra

Target Audience

- Identify project with education & training needs
  - Audit requirement (#1 priority)
  - Identify future project training requirements (#2 priority)
- Identify Cost Account Managers (CAMs)
  - List of Priority 1 CAMs
  - List of Priority 2 CAMs
- Interrogate training records
  - Identify training gaps
  - Schedule CAMs for class

Monitor Attendance

	REQUIRED JPL EVM & MATERIAL MGMT TRAINING for 3X PEMs & CAMs													
					EVM/Performance Mgmt Workshop (12 Hour Course)					Integrated Material Management - A (2 Hour Course)				
	Name	Project	ORG	PEM/CAM	Cmpltd Before 8-Aug	8/4/2006 Mandatory Attendance	8/8/2006 Mandatory Attendance	8/21/2006 Too Late for Audit		Cmpltd Before 4-Aug	4-Aug	21-Aug	24-Aug	28-Aug
1	GAVIT, SARAH	KEPLER	310	CAM			X			C				
2	BROWN, G.M.	DAWN	310	PEM		X					X			
3	DURHAM, DAVID M - 101218	AQUAR	310	PEM	C					C				
4	HOLDEN, JAMES R	OCO	310	PEM	C					C				
5	GUSKE, PATRICK J	OCO	313	CAM	C									
6	KORDON, MARK A	DAWN	313	CAM		X								
7	SCHIMMELS, KATHRYN A	DAWN	313	CAM	C*					C				
8	TALLEY, KEVIN P	PHOENIX	313	CAM		X				C**				
9	BUCK, CARL W	KEPLER	314	CAM	C*					C				
10	SMITH, ROBERT R	DAWN	314	CAM	C*					C**/C				
11	ZAMORA, KATHYA G	DAWN	314	CAM	C*					C**				
12	WIRTH, JOHN W - 101290	AQUAR	314	PEM	C					C				
13	BINGHAM, ANDREW W	DAWN	315	CAM			X			C**/C				
14	DUBON, LYDIA	DAWN	315	CAM			X				X			
15	ELLIOTT, ROBERT G	DAWN	315	CAM	C					C				
16	MIYAZONO, CALVIN K	DAWN	315	CAM	C					C				
17	MURRAY, ALEXANDER T - 104313	AQUAR	316	CAM		X		X					X	
18	GODDARD, JAMES L	DAWN	317	CAM										X
19	POLANSKEY, CAROL	DAWN	317	CAM	C*						X			
20	THOMAS, REID C	DAWN	317	CAM			X			C				
21	RAYMOND, CAROL A.	DAWN	322	PEM		X								
22	GAUTIER, THOMAS N	KEPLER	326	CAM		X				C				
23	CHAO, YI - 101680	AQUAR	328	PEM			X					X		
24	MILLER, CHARLES E	OCO	328	PEM	C					C				

Education – Lessons Learned

- Modularize training
  - Projects wanted just-in-time training that supported the project's life cycle
- Soliciting additional Sr. Mgt support to attend courses
- Monitoring and status course attendance

EVMS Validation

- Progress Assistance Visits
- Validation Review Process

Progress Assistance Visits – DCMA

- Familiarization with contractor's EVMS
- Assess contractor progress towards compliance with Industry Guidelines
  - Documentation/data review
  - Manager interviews
- Identify potential problems, clear up misunderstandings
  - Discrepancy Reports
- Prepare evaluation report
- Present findings/recommendations to contractor
- Establish date for Initial Validation Review

JPL PAV – Lessons Learned

- Joint NASA/DCMA team conducted two PAV's in preparation for Validation Review
  - JPL would not have achieved Systems Validation without PAV's
  - PAV's help focus lab management and resources to address remaining gaps
  - PAV Team recommended alternative approaches to satisfy EVMS criteria

Validation Review Process

- What is a Validation Review
- Validation Review process
- JPL Validation Review lessons learned

What Is a Validation Review?

- Formal recognition of certification by an independent party that a company's EVMS meets the ANSI/EIA-748 EVMS Guidelines
- Ensure management system development and deployment meets the intent of the industry guidelines
  - For effective and efficient planning and control
  - To properly relate cost, schedule ,and technical accomplishment
  - To ensure valid, accurate, and timely data

Validation Review Process

- Determine EVMS compliance
  - Ensure management system design and operation meets the intent of the Industry Guidelines
  - Assess supplier's knowledge and use of the EVMS
  - Documentation/data review
  - Manager interviews
- Present findings/recommendations to the supplier
- Establish detailed corrective action plan
  - For closure of outstanding issues
  - For obtaining acceptance
- Complete evaluation report

JPL Validation Review – Lessons Learned

- Provide logistic support
  - Facility for review team
    - Power
    - Internet access
    - Projection
  - Schedule and facilitate CAM interviews
- CAM interviews
  - CMIO team member attended interviews
  - Take copious notes
  - Team meetings to out brief the days events

JPL Validation Review – Lessons Learned

- Resolving Validation Team issues
  - Identify any issues early in the review
  - Ask for clarification
  - Resolve issues prior to Validation Team departure
  - Track the closure of all Discrepancy Reports
  - Monitor closeout issues

Conclusion

- EVMS renders a business process to practice and should not be confused with a tool installation
- Form an Integrated Product Development Team
- Define your processes
- Pilot Process with the tools – incorporate changes
- Develop just-in-time education for the PROCESS and the tools
- Perform surveillance and analyze weaknesses – process, tool, practice, education
- EVM – it's not a job; it's an Adventure!